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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,925	03/10/2004	Andreas Lopp	SANZ-253	3357
24972 7590 04/12/2007 FULBRIGHT & JAWORSKI, LLP 666 FIFTH AVE NEW YORK, NY 10103-3198			EXAMINER BAND, MICHAEL A	
			ART UNIT	PAPER NUMBER
			1709	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/12/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/797,925

Applicant(s)

LOPP ET AL.

Examiner

Michael Band

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 8/29/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: Specification headings such as "Field of the Invention," "Description of the Related Art," "Summary of the Invention," etc are missing.

Appropriate correction is required.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a

nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

2. The disclosure is objected to because of the following informalities: spelling. In the second paragraph, the word "vacuo" is present. Examiner thinks applicant meant the word "vacuum".

Appropriate correction is required.

3. The claims are objected to because they include reference characters which are not enclosed within parentheses, such as "C", "d", and "B".

Reference characters corresponding to elements recited in the detailed description of the drawings and used in conjunction with the recitation of the same element or group of elements in the claims should be enclosed within parentheses so as to avoid confusion with other numbers or characters which may appear in the claims. See MPEP § 608.01(m).

Drawings

4. The drawings are objected to under 37 CFR 1.83(a) because they fail to show "d" in figure 1 as described in the specification (p. 4, para 19). From figure 1, "d" at the bottom of the plasma tube seems to be the either horizontal, vertical, or both sets of arrows. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office

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action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-7, 9-15, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison, Jr. (US Patent No. 4,461,688) in view of Lehan (WO96/21750) and Hughes et al (US Patent No. 5,873,989).

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With respect to claim 1, Morrison '688 discloses a magnetron and target (abstract, lines 1-2; figure 5, part 12) with the magnetron comprising a magnet system with at least one inner magnet and at least one outer magnet (figure 5, parts 46'52'). This magnet system forms at least one closed plasma tube (i.e. plasma loop or plasma path) between an inner and outer magnet (abstract, lines 10-14 and lines 19-20). Between the inner and outer magnets, there exist two regions at a distance from one another as evidenced by the space between either S and N poles or N and N poles (figure 5).

However Morrison '688 is limited in that there is no description or illustration to display the shape of the plasma tube.

Lehan '750 displays a plasma racetrack (figure 2B) schematically similar in design to applicant with dimensions " W_L " (i.e. "d") and " D_P " (i.e. " $B/2$ "). This type of design reduces erosion of a target at the end portions while the magnetic field at the ends need not be significantly reduced, leading to maintained efficiency of magnetron (abstract).

It would have been obvious to one of ordinary skill in the art to use the plasma racetrack taught in Lehan '750 as the plasma tube in Morrison '688 in order to gain the advantages of reduced erosion of the end portions of target while not reducing the magnetic field and thus, maintaining magnetron efficiency and one of ordinary skill would have a reasonable expectation of success in making such a modification.

However Morrison '688 is limited in that the magnets do not move over the target.

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Hughes '989 teaches a sputtering magnetron contained inside a vacuum chamber capable of moving linearly across a target and utilizing a plasma tube. The abstract discloses "a magnet assembly disposed in proximity of the target" (abstract, lines 3-4) and "a drive assembly for scanning (i.e. moving) the magnet assembly relative to the target" (abstract, lines 5-6) in order for the magnet to sputter more of the target area.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a moving magnetron relative to target and plasma race-track taught in Hughes '989 as part of the sputtering magnetron apparatus in Morrison '688 in order to gain the advantages of increased efficiency in uniform erosion of the target well known in the art and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

With respect to claim 2, Morrison '688 discloses a magnetron and target (abstract, lines 1-2; figure 5, part 12) with the magnetron comprising a magnet system with at least one inner magnet and at least one outer magnet (figure 5, parts 46'52'). This magnet system forms at least one closed plasma tube (i.e. plasma loop or plasma path) between an inner and outer magnet (abstract, lines 10-14 and lines 19-20). Between the inner and outer magnets, there exist two regions at a distance from one another as evidenced by the space between either S and N poles or N and N poles (figure 5).

However Morrison '688 is limited in that there is no description or illustration to display the shape of the plasma tube.

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Lehan '750 displays a plasma racetrack (figure 2B) schematically similar in design to applicant with dimensions " W_L " (i.e. " d ") and " D_P " (i.e. " B "/2). This type of design reduces erosion of a target at the end portions while the magnetic field at the ends need not be significantly reduced, leading to maintained efficiency of magnetron (abstract). Since " B " was obviously less than " d " as discussed, " B " greater than or equal to " $2d$ " must hold true if both " B " and " d " are greater than one.

It would have been obvious to one of ordinary skill in the art to use the plasma racetrack taught in Lehan '750 as the plasma tube in Morrison '688 in order to gain the advantages of reduced erosion of the end portions of target while not reducing the magnetic field and thus, maintaining magnetron efficiency and one of ordinary skill would have a reasonable expectation of success in making such a modification.

However Morrison '688 is limited in that the magnets do not move over the target.

Hughes '989 teaches a sputtering magnetron contained inside a vacuum chamber capable of moving linearly across a target and utilizing a plasma tube. The abstract discloses "a magnet assembly disposed in proximity of the target" (abstract, lines 3-4) and "a drive assembly for scanning (i.e. moving) the magnet assembly relative to the target" (abstract, lines 5-6) in order for the magnet to sputter more of the target area.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a moving magnetron relative to target and plasma race-track taught in Hughes '989 as part of the sputtering magnetron apparatus in Morrison '688 in order to

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gain the advantages of increased efficiency in uniform erosion of the target well known in the art and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

With respect to claims 3 and 11, Morrison '688 further discloses figure 11 having magnetic fields A and B. In between A and B, two significantly smaller fields are seen. There exists a certain distance between parts 120/132 and parts 108/130 (i.e. distance C) that separates the two. The horizontal midpoint of each white space between parts 120/132 and parts 108/130 represents the endpoints of the certain distance (i.e. distance C). According to the drawing, the magnetic fields present in figure 11 are similar to the fields depicted in the application drawings. In figure 11 it appears that at either contrived endpoint, the component of the magnetic field perpendicular to the surface of the target is zero.

With respect to claims 4 and 12, Morrison '688 further discloses figure 11 that has smaller magnetic fields between magnetic fields A and B, forming a semi-oval from the points at which the smaller magnetic fields intersect the target. Figure 3 displays prior art with a schematically similar magnetic arrangement as that of Morrison '688. The acute angle present is 45° .

However Morrison '688 is limited in that figure 3 displays an angle of 45° , while applicant claims an angle of 20° .

It has been held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device,

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the claimed device was not patentably distinct from the prior art device. *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Therefore it would have been obvious to one of ordinary skill in the art to have the magnetic field form a plurality of angles, including 20° and 45°, and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 5 and 13, Morrison '688 further discloses a "closed plasma loop" (abstract; col. 7, lines 61-68; col. 8, lines 1-9) that is schematically similar to the plasma tube described by application. From figure 11, the smaller magnetic fields between magnetic fields A and B, a semi-oval is formed from the points at which the smaller magnetic fields intersect the target. The angles formed from these intersections are acute angles. Figure 2 in Morrison '688 displays the magnetic field forming an angle of 45° with that of the target.

However Morrison '688 is limited in that figure 2 displays an angle of 45°, while applicant claims an angle of 20°.

It has been held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

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Therefore it would have been obvious to one of ordinary skill in the art to have the magnetic field form a plurality of angles, including 20° and 45° , and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 6 and 14, Hughes '989 further discloses that the magnet assembly that "is linearly scanned (i.e. moved) by the drive assembly along a scan direction relative to target" (col. 3, lines 1-2). "The magnet assembly is scanned with a reciprocating linear movement and changes direction at or near opposite edges of the target" (col. 5, 63-65).

With respect to claims 7 and 15, Morrison '688 further discloses figure 10 which has a long bar magnet on the outsides (figure 10, parts 108 and 120) with a short magnet at the ends (figure 10, parts 110, 112, 122, and 124) as a "roof". A smaller bar magnet is on the inside (figure 10, parts 130 and 132). The closed plasma loops run between the smaller bar magnets and the long bar magnets with "roofs" as evidenced by figure 11.

With respect to claims 9 and 17, Morrison '688 further depicts figure 11 having similar types of magnets (i.e. small and long magnets) that form two distinct outer regions, with one part of the first region composing the second region and vice versa. The two regions also have an inner magnet with the outer boundary being composed of an arrangement of long and short magnet bars. Morrison '688 further depicts figure 13 having a comparable shape with the plasma tubes sharing a boundary that separates the two tubes.

However Morrison '688 is limited in that the magnets only contain 2 tubes instead of 3 tubes.

Although the reference does not disclose three tubes, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

Therefore it would have been obvious to one of ordinary skill in the art to duplicate the closed plasma loop any number of times in order to increase efficiency in uniform target erosion, increase film uniformity thickness onto substrate, increase overall target area sputtered, and decrease overall amount of sputtering time needed per substrate and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 10 and 18, Morrison '688 further depicts figure 10 having the outer magnets (figure 10, parts 108, 114, 116, 120, 126, and 128) as all being parallel, with parts 114, 116, 126, and 128 being shorter than parts 108 and 120. Figure 10 further depicts that the ends of the two magnets are connected with one another by an L-form magnet configuration, for example, figure 10, parts 126 and 122.

7. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison, Jr. (US Patent No. 4,461,688), Lehan (WO96/21750), and Hughes et al (US Patent No. 5,873,989) as applied to claims 7 and 15 above, and further in view of Tsukasa (JP 10,088,339).

With respect to claims 8 and 16, the references are cited as discussed for claims 1, 2, 7 and 15.

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Morrison '688 depicts figure 10 as having the inner magnet a prism shape.

However Morrison '688 is limited in that the entire inner magnet is of a uniform length and width instead of having a smaller diameter at its ends than its center.

Tsukasa '339 teaches an inner magnet (part 70) that has a smaller diameter at the point than in the center. The inside magnet is rectangular until reference point A1, at which the magnet becomes smaller than the center part. This enhances the availability of a target "by making the cross-sectional area of erosion in the vicinity of both edge parts in the longitudinal direction not larger than the cross-sectional area of erosion in the center part in the longitudinal direction in the cross-sectional area of erosion in the reciprocating direction of a magnet unit" (abstract).

It would have been obvious to one of ordinary skill in the art to use the inner magnets taught in Tsukasa '339 as the inner magnet for the plasma track in Morrison '688 in order to gain the advantage of improved availability of a target well known in the art and one of ordinary skill would have a reasonable expectation of success in making such a modification.

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Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent No. 6,306,267; US Patent No. 6,207,028; US Patent No. 5,458,759 are cited as demonstrating the state of the art.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 8am-4pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER

MAB

